flowing a molecular stream through a reaction chamber, the molecular stream comprising an aluminum precursor, an oxidizing agent, and an infrared absorber; and

pyrolyzing [a] the flowing molecular stream in a reaction chamber[, the molecular stream comprising an aluminum precursor, an oxidizing agent, and an infrared absorber], where the pyrolysis is driven by heat absorbed from a continuous wave laser beam.

C2 cont

18. (Amended) The method of claim [16] 17 wherein the aluminum oxide particles have an average diameter from about 5 nm to about 100 nm.

REMARKS

Claims 1-3 and 5-22 remain for consideration. Applicants have amended claims 1 and 18 to correct minor errors. Applicants have amended claim 17 to more distinctly claim Applicants invention. The amendment of claim 17 is supported by the specification, for example, at page 6, lines 3-6 and page 9, lines 1-6. Also, Applicants have updated an additional citation to a patent. No new matter is added by the amendments.

Applicants submit herewith a Declaration by Dr. Nobuyuki Kambe. Applicants respectfully request reconsideration of the rejections of the claims. Furthermore, Applicants respectfully request withdrawal of the finality of the Office Action for the reasons stated below with respect to Obviousness-Type Double Patenting.

Rejections Under 35 U.S.C. §112

The Examiner rejected claims 1-3 and 5-16 under 35 U.S.C. §112, second paragraph as being indefinite. In particular, the Examiner objected to the reference to "the primary particles" because there was no explicit earlier reference to primary particles. Applicants have deleted "the" from the phrase. However, Applicants note that presence of primary particles is

clearly inherent such that the use of the article "the" would not lead to indefiniteness. Also, the dependency of claim 18 has been corrected. Applicants respectfully request the withdrawal of the rejection of claims 1-3 and 5-16 under 35 U.S.C. §112, second paragraph.

Rejections Under 35 U.S.C. §103(a) Over Single References

The Examiner rejected claims 1-3, 5-8 and 19-22 as being unpatentable over any one of U.S. Patent 4,861,572 to Sugoh et al. (the Sugoh patent), U.S. Patent 4,705,762 to Ota et al. (the Ota patent), U.S. Patent 5,635,154 to Arai et al. (the Arai patent), U.S. Patent 5,417,956 to Moser (the Moser patent) and U.S. Patent 5,447,708 to Helble et al. (the Helble '708 patent). The Examiner cited these five references for teaching particle sizes within the claimed range. Applicants respectfully request reconsideration of the rejections based on the following comments. For conciseness, Applicants do not repeat all of the comments from their previous Amendments, even though these comments have continuing relevance.

First, with respect to the Arai patent, the portion of the patent cited by the Examiner (column 2, lines 1-15 and column 3 [column 4?], line 47) do not contradict in any way, Applicants' assertion that the Arai patent does not disclose the production of aluminum oxide. The Arai patent discloses the production of aluminum oxyhydroxide not aluminum oxide. Thus, the Arai patent cannot render Applicants' claimed invention obvious. The following comments are also applicable to the Arai patent as well as the other cited references.

"In rejecting claims under 35 U.S.C. §103, the examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). "Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant." Id. All claim limitations must be taught or suggested by the prior art. See MPEP 2143.03. "Obviousness cannot be predicated on what is unknown." In re

Rijckaert, 28 USPQ2d at 1957, citing In re Spormann, 150 USPQ 449, 452 (CCPA 1966).

Assertions in a prior art reference do not support an anticipation or obviousness rejection unless the references place the claimed invention in the hands of the public. Beckman Instruments Inc. v. LKB Produkter AB, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989). "In order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method." Id. While a reference is prior art for all that it teaches, references along with the knowledge of a person of ordinary skill in the art must be enabling to place the invention in the hands of the public. In re Paulsen, 31 USPQ2d 1671, 1675 (Fed. Cir. 1994). See also In re Donohue, 226 USPQ 619, 621 (Fed. Cir. 1985).

The Examiner notes that "a reference is good not only for what it teaches but also for what one of ordinary skill might reasonably infer from the teachings." However, "[t]o imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." W. L. Gore & Assocs., Inc. v. Garlock, Inc., 220 USPQ 303, 312-13 (Fed. Cir. 1983). **"Skill in the art does not act as a bridge over gaps in the substantive presentation of an obviousness case, but instead supplies the primary guarantee of objectivity in the process."** All-Site Corp. v. VSI International Inc., 50 USPQ2d 1161, 1171 (Fed. Cir. 1999)(emphasis added).

Applicants acknowledge that the cited references disclose aluminum oxide particles with overlapping **average particle sizes**. However, Applicants do not believe that the Examiner has established prima facie obviousness because the claims include additional characterization other than average particle diameter. Specifically, Applicants' claims include values corresponding to

the **distribution of particle sizes around the average**. The particle size distribution is an **independent property** of the powders. Thus, two collections of powders can have the same average particle size, but a very different particle size distribution.

In response to Applicants' arguments regarding differences in particle size distributions, the Examiner responded that "the ranges defined by the references imply a variety of distributions, including the claimed one." Applicants believe that this unsubstantiated assertion is untrue. The particle size distribution is a direct consequence of the method used to produce the particles. The particle size distribution is not an arbitrary parameter that can be selected arbitrarily to meet Applicants' claim parameters. Until Applicants developed their approach for the synthesis of aluminum oxide, no approach was available for the production of aluminum oxide nanoparticles having an average particle diameter less than about 500 nm **with the narrow particle size distributions disclosed and claimed by Applicants. This proposition is supported by the enclosed declaration by Dr. Nobuyuki Kambe, one of the present inventors.**

Applicants believe that the Examiner has failed to establish prima facie obviousness based on the cited references. To the extent that the Examiner has established prima facie obvious, Applicants have rebutted the asserted obviousness by submitting Dr. Kambe's Declaration substantiating that approaches for the production of aluminum oxide particles with the claimed narrow particles size distributions were not available to a person of ordinary skill in the art prior to Applicants' invention.

In view of the above arguments and the enclosed Declaration, Applicants respectfully request the withdrawal of the rejection of claims 1-3, 5-8 and 19-22 as being unpatentable over any one of the Sugoh patent, the Ota patent, the Arai patent, the Moser patent and the Helble '708 patent.

Rejection Of Claims 1-3, 5-16 and 19-22

The Examiner rejected claims 1-16 and 19-20 under 35 U.S.C. §103(a) as being unpatentable over either U.S. Patent 5,804,513 to Sakatani et al. (the Sakatani patent) alone or in view of U.S. Patent 5,697,992 to Ueda et al. (the Ueda patent), the Ueda patent alone, U.S. Patent 5,868,604 to Atsugi et al. (the Atsugi patent) alone or in view of the Ueda patent, U.S. Patent 4,021,263 to Rosenblum (the Rosenblum patent) alone or in view of the Ueda patent, U.S. Patent 5,228,886 to Zipperian (the Zipperian patent) alone or in view of the Ueda patent, U.S. Patent 5,300,130 to Rostoker (the Rostoker '130 patent) alone or in view of the Ueda patent, U.S. Patent 5,389,194 to Rostoker et al. (the Rostoker '194 patent) alone or in view of the Ueda patent, or U.S. Patent 5,527,423 to Neville et al. (the Neville patent) alone or in view of the Ueda patent. The Examiner points to various citations in these patent referring to aluminum oxide particles having a nanometer size. Applicants respectfully request reconsideration of the rejections based on the following comments. Applicants do not repeat their previous arguments from earlier Amendments, even though these comments have continuing relevance.

Applicants believe that the Examiner has failed to establish prima facie obviousness because the cited references do not teach or suggest aluminum oxide particles inherently having the narrow particle size distributions. The narrow particle size distributions are independent of the average particle diameters. Thus, even though the cited references disclose overlapping **average particle diameters**, the cited references do not inherently disclose the **narrow particle size distributions**. The Examiner asserted that the "ranges defined by the references imply a variety of distributions, including the claimed ones." However, the particle size distribution is a function of the method used to produce the particles. Until Applicants' developed their approach for the production of aluminum oxide, no approach was available for the

production of aluminum oxide particles having average particle sizes less than about 500 nm with the narrow particle size distribution. Applicants have previously outlined how some of the other approaches are specifically deficient with respect to the production of the claimed narrow particle size distributions.

Even though Applicants believe that the Examiner has failed to establish prima facie obviousness, Applicants submit herewith a Declaration by Dr. Kambe establishing that known synthesis methods prior to the development of Applicants' approach did not produce the narrow particle size distribution claimed by Applicants. This Declaration establishes that the materials claimed by Applicants are not rendered obvious by the cited references. In earlier Amendments, Applicants discussed how the information on particle size distributions in some of the cited references were consistent with the advance represented in Applicants' claimed invention.

Based on the above arguments and the enclosed Declaration, Applicants respectfully request the withdrawal of the rejection of claims 1-3, 5-16 and 19-20 under 35 U.S.C. §103(a) as being unpatentable over either the Sakatani patent alone or in view of the Ueda patent, the Ueda patent alone, the Atsugi patent alone or in view of the Ueda patent,the Rosenblum patent alone or in view of the Ueda patent, the Zipperian patent) alone or in view of the Ueda patent, the Rostoker '130 patent alone or in view of the Ueda patent, the Rostoker '194 patent alone or in view of the Ueda patent, or the Neville patent alone or in view of the Ueda patent.

Rejection of Claims 17-18 Over Shimo

The Examiner rejected claims 17 and 18 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 5,064,517 to Shimo (the Shimo patent). The Examiner cites the Shimo patent for disclosing Applicants' claimed invention for the production of nanoscale aluminum oxide particles. Applicants have amended claim 17 to indicate that the reactants are flowed through the reaction chamber. In view of the above amendments and the following

comments, Applicants respectfully request reconsideration of the rejections over the Shimo patent.

The Shimo patent describes a process wherein gaseous reactants are placed within a reaction chamber. See, for example, column 2, lines 50-54 and column 7, lines 64-69. The reaction is initiated by irradiating the reactants with light, and the product particles are collected from the walls of the chamber. See, for example, column 8, lines 45-48 and column 9, lines 12-15. The Shimo patent does not teach or suggest reacting a **flowing** reactant stream. Thus, the Shimo patent does not disclose the first element of Applicants' claimed method, as amended. Since the reaction of a flowing reactant stream is absent from the prior art reference, the Shimo patent does not render Applicants' claims obvious. Applicants respectfully request withdrawal of the rejection of claims 17 and 18 under 35 U.S.C. §103(a) as being unpatentable over the Shimo patent.

Rejection of Claims 17 and 18 Over A Combination of References

The Examiner rejected claims 17 and 18 under 35 U.S.C. §103(a) as being unpatentable over the references cited against claim 1 further in view of the Shimo patent. The Examiner argues that it would have been obvious to manufacture the aluminum oxide particles described by the references cited against claim 1 using the method disclosed by the Shimo patent. Applicants have amended claim 17 to indicate that the reactants are flowing when the reaction takes place. Applicants respectfully request reconsideration based on the above amendments and the following comments.

As noted above, the Shimo patent does not teach or suggest, Applicants' claimed method. Therefore, it is irrelevant whether or not the Shimo patent can be used to produce the materials disclosed in the other cited references. The cited references alone or in combination do not teach or suggest Applicants' claimed method, as amended. Therefore, the combination of references do not render claims 17 and 18 obvious. Applicants respectfully request

withdrawal of the rejection of claims 17 and 18 under 35 U.S.C. §103(a) as being unpatentable over the references cited against claim 1 further in view of the Shimo patent.

Double Patenting

Since the Examiner did not renew the provisional Obviousness-Type Double Patenting rejection over the claims of copending application **08/961,735**. Applicants assume that this rejection has been withdrawn in view of Applicants' previous arguments.

The Examiner has further "suggested" that Applicants file a Terminal Disclaimer over copending application **09/433,202** (the '202 application) even though no rejection was made. Applicants believe that it was **manifestly unfair** to include **implicitly** a Double Patenting rejection without formally laying out the rejection just to make the Office Action final. Applicants cannot reasonably respond to this **phantom rejection** without seeing the basis for the rejection. **Applicants respectfully request the withdrawal of the holding of finality so that Applicants can properly consider an Obviousness-Type Double Patenting rejection over the '202 application.**

CONCLUSIONS

In view of the above amendments and remarks, Applicants submit that this application is in condition for allowance pending a possible obviousness-type double patenting rejection over the '202 application. The Examiner is invited to telephone the undersigned attorney to discuss any questions or comments that the Examiner may have.

The Director of the Patent Office is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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